DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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PETROGRAPHY OF A CARBONATE ROCK FROM WANGIANA NEAR CURDIMURKA.
Specimen 6438RS255

GEOLOGICAL SURVEY

by

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PETROGRAPHY OF A CARBONATE ROCK FROM WANGIANA NEAR CURDIMURKA

ABSTRACT

The sediment was originally a fine quartz sandstone with a little fresh feldspar. Later introduction of calcite replaced any matrix that might have been present and corroded substantially the detrital clasts. The evidence does not permit a distinction between an origin as calcrete and as the result of calcification at depth.

INTRODUCTION

A hand specimen and a thin section of rock believed to be carbonate-rich were received from Mr Graham Krieg for petrographic description.

PETROGRPAHY

Specimen 6438 RS 255, TS C399245

Rock name. Sandy limestone

Hand specimen

The specimen is bounded on two sides by sub-parallel faces and the weathered surfaces carry markings which may be in part traces of an irregular bedding. Fine bedded structures are not visible, however, on the broken or sawn faces of the specimen and as far as may be determined the fine texture is massive and homogeneous. A few cleavage faces suggest that the grain is coarse.

A network of fine fractures is present but there are no signs of any biogenetic textures. The rock is grey brown on the fresh surfaces and rusty brown on the weathered surfaces.

The cut surface effervesces vigourously when a drop of 1:10 hydrochloric acid is applied.

Thin section

In thin section the rock is seen to be less homogeneous than might be expected from the hand specimen. It is in fact a fine to medium grained sandstone with a matrix of a carbonate which stains a light pink with alizarin red. Quartz, muscovite, a little biotite, plagioclase, microcline, lithic fragments, tourmaline and a little zircon are minor and accessory detrital constituents and a dark brown translucent but apparently non-crystalline mineral is partly detrital and partly concretionary.

Quartz is by far the most abundant detrital mineral. It is mainly of fine sand grade but includes occasional medium grains. The grains are very varied in shape and many show the effects of corrosion by the solutions which deposited intergranular carbonate. No evidence remains of the original shape of the detrital clasts and it is probable that a substantial proportion of the grains has been removed from their margins. Where elongated grains are present they show no preferred orientation.

Muscovite flakes are not abundant but are widely distributed throughout the rock. The flakes do not appear to have any preferred orientation.

Only a very few flakes of altered biotite are present.

Detrital plagioclase is rare and microcline is even rarer but both occur as perfectly fresh clasts. The grains have been corroded at the margins in the same way as have the quartz grains.

Lithic fragments are very rare but a few grains, sometimes coarse, of arenaceous sediments are present. Argillaceous rocks are not represented but a fragment orginally composed of chalcedonic silica was probably a chert.

Tourmaline is more abundant than the feldspars. It occurs as small, marginally-corroded grains of pink, blue, green and yellow types.

Zircon is a rare accessory. The grains do not show evidence of corrosion.

Fine grains and larger patches of a dark brown material with no measurable optical properties are abundant. More than one mineral may be included in this category since the colour and degree of crystallinity of the material varies and since some grains appear to be of detrital origin while others show evidence of replacement of other minerals and are probably concretionary and post-diagenetic in origin.

There is no matrix in the sediment apart from the ubiquitous carbonate. If there ever were a clay matrix, it has been completely replaced by corrosion and carbonate deposition. It is possible that carbonate may have formed part or all of an original matrix but again no evidence remains. The carbonate now occurs as large crystals in optical continuity over wide areas but of interstitial habit, enclosing the detrital component of the sediment. Very few of the clasts are in contact at any point and, apart from textural evidence of marginal corrosion, it is reasonable to suppose that the 'floating' clasts are evidence that the solutions responsible for depositing the carbonate corroded clasts as well as matrix. The carbonate is calcitic on the evidence of its vigour of effervescence with HCl and the pale pink colour it has absorbed from the alizarin red stain is

probably more a result of variation in technique during the preparation of the thin section than of a high dolomitic component in the carbonate. While the latter may not be a pure calcite, it is certainly more of a calcite than a dolomite. The carbonate is slightly more abundant than the clastic component.

Comment

The rock was originally a fairly well-sorted, fine sandstone although some coarser clasts are present. It may or may not have had a muddy matrix. If it had been well-bedded some traces would probably have remained despite the later alteration. The presence of fresh plagioclase and microcline suggests that the sediment was derived from the erosion of a terrain in which granitoid plutons were exposed. The remainder of the country rock was probably sedimentary rather than regionally metamorphosed but the tourmaline content of the rock suggests some contact alteration, possibly greisenisation. To retain fresh feldspar the sediment must either have been rapidly sealed by lithification or must have been subject only to intermittent wetting for a short period at any one time.

Lithification may have been the result of carbonate deposition at or shortly after the deposition of the detritus but the introduction of calcite may have been post-diagenetic. There is no evidence in the specimen by itself as to whether it is a calcrete or the result of calcification at a substantial depth.

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